Roentgenogram of the Month

Duodenum Inversum

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Duodenum inversum is usually associated with chronic abdominal pain which is of unknown etiology. Incomplete rotation of the bowel may be associated with this anomaly. An unusually high incidence of pancreatitis, elevated bilirubin, and hypoalbuminemia was noted in this series of nine patients.

Duodenum inversum is a congenital anomaly associated with the third portion of the duodenum being located to the right of the second portion or above the duodenal bulb. When the third portion is to the right of the second portion, the variation is often called "partial" duodenum inversum or figure-of-eight duodenum. Mobile and immobile types have been described but this mobility seems to be no more than the normal duodenal movement with change in position. Usually the more distal duodenum passes behind the duodenal bulb although an anterior passage has been described.[1] Redundancy of the first portion of the duodenum (a common normal variant), torus defects (malrotation), "mirror image," and closed duodenal loops should be distinguished from duodenum inversum (Figure 1). The reported incidence varies from 14/20,000 to 1/100.[2]

Variously, duodenum inversum has been described as of no significance, predisposing to cholecystitis, pancreatitis, or peptic ulcer disease, or associated with atypical abdominal pain of no significance.[1-7]

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Materials and Methods

Records of nine patients with duodenum inversum diagnosed in the past four years were reviewed. The anomaly was exclusively mentioned by the author and not recognized by other radiographers. All patients had abdominal pain.

Case Presentation

M.D., a 24-year-old woman, complained of abdominal pain since experiencing a kick in the abdomen at nine years of age. The pain occurred two to three times per day every two to three days and was associated with nausea and dizziness but no vomiting, melena, or abdominal distention. Relief was obtained by lying on either side. The physical examination was unremarkable. A bilirubin level of 2 mg/dl was noted on two occasions and an albumin level of 3.5 gm/dl; both were unexplained. An upper gastrointestinal examination revealed duodenum inversum and incomplete rotation (Figures 2 & 3). At laparotomy, the gallbladder and liver appeared normal. The third portion of the duodenum passed under but not to the left of the superior mesenteric vessels. A short left mesocolon was noted. A left upper quadrant cecopexy did not relieve the abdominal pain.

Results and Discussion

Three of six patients, in whom bilirubin determinations were performed, showed mildly elevated levels. Five of eight also showed low albumin levels (3.5 gm/dl or less). Whether these findings could be related to compression of the common bile duct due to an anomalous course similar to a case reported by Sandera[7] could not be ascertained.

Two patients in this series also had incomplete rotation of the gut. Frazer and Robbins claimed that duodenal and "umbilical loop" (that portion of bowel rotating around the superior mesenteric artery) rotation are independent.[8] This is undoubtedly erroneous as the "mirror image" duodenum seems to be constantly associated with incomplete rotation. The two cases of incomplete rotation in this series would also seem to refute this theory as well as the theory of jejunal fusion in the left upper quadrant indicating normal "umbilical loop" rotation. Both of these cases had left upper quadrant duodenojejunal junctures. One patient in this series had a previous colectomy with no mention of colon position and another had a high cecum which is not considered a rotational anomaly by some authors.

Two patients also were treated for pancreatitis although ethanol use was a possible factor. Cholecystitis and peptic ulcer disease were not documented

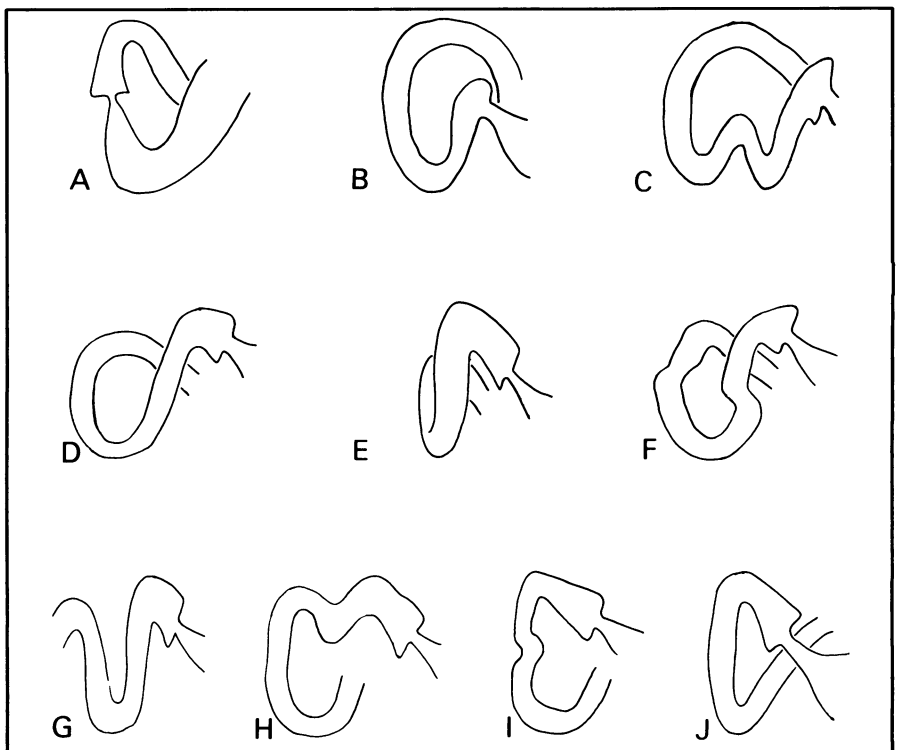

Figure 1. Line drawings A-F depict duodenum inversum. D-F are often described as a partial type. G, the "mirror image" duodenum, is considered a duodenum inversum by some authors. H-J represent redundant, torus, and closed loop duodena, respectively

in this series. The cause of the biochemical alterations seen in this series is unexplained. The relief of pain noted by change of position is of interest in the case presented as this patient had abnormal bowel position.

Literature Cited

1. Buckstein J: The duodenal curve. In The Digestive Tract in Roentgenology, ed 2. Philadelphia, JB Lippincott, 1953

2. Feldman M: Clinical Roentgenology of the Digestive Tract, ed 4. Baltimore, Williams and Wilkins, 1957

3. Faegenburg D, Bosniak M: Duodenal anomalies in the adult. Am J Roentgenol 88:642-657, 1962

4. Hürthle R: Beiträge zur Kenntnis des Duodenum Inversum. Fortschr Geb Roentgenstr Nuklearmed 48:265-270, 1933

5. Sandera R: Das Duodenum mobile in Röntgenbilde. Fortschr Geb Roentgenstr Nuklearmed 44:574-599, 1931

6. Sandera R: Das Echte Duodenum Inversum: Ein Typische Lagevariation des Duodenum. Fortschr Geb Roentgenstr Nuklearmed 46:576-582, 1932

7. Sandera R: Über Lagevariationen der Flexura Duodenojejunalis und des Oberen Jejunum bei einem Typus des Forminvers Gelagerten Duodenum. Fortschr Geb Roentgenstr Nuklearmed 48:22-29, 1933

8. Frazer JE, Robbins RH: On the factors concerned in causing rotation of the intestine in man. J Anat 51:75-110, 1915

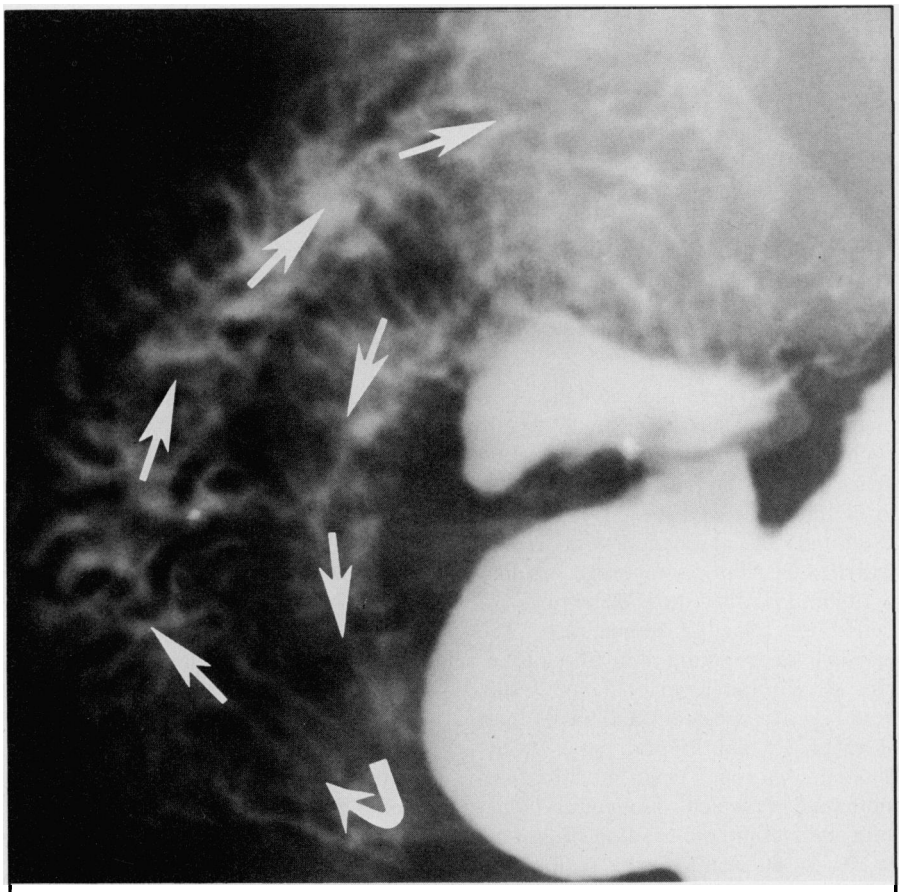

Figure 2. Duodenum inversum. Note arrows

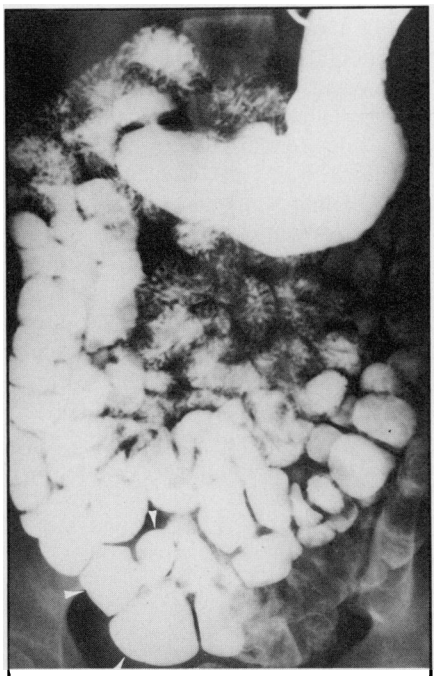

Figure 3. The entire colon is located to the left of the midline, other than the cecum (arrows) and ascending colon